

Practice Problems

Differentiate each of the following functions. Assume that a is a constant. Please note that the inverse function for $\sin x$, (sometimes denoted by $\sin^{-1} x$) is denoted by $\arcsin x$ here.

1. $f(x) = e^{3-x}$

9. $f(x) = \cos x \cdot 10^{\sin x}$

16. $f(x) = \frac{x}{x+1}$

2. $f(x) = \arctan x$

10. $f(x) = -\frac{1}{4}e^{-2x} - \frac{1}{2}xe^{-2x}$

17. $f(x) = \arctan\left(\frac{x}{x+1}\right)$

3. $f(x) = \sqrt{a^2 - \sin^2 x}$

11. $f(x) = \frac{1}{2}(\arcsin x)^2 + e^5$

18. $f(x) = \arcsin(x^2 - 1)$

4. $f(x) = \arcsin 3x$

12. $f(x) = 10 \sin 2x \cos 2x$

19. $f(x) = \log_3(\sec x)$

5. $f(x) = 2^{5x^2+1}$

13. $f(x) = \frac{1}{2}x^2 \ln x - \frac{1}{4}x^2$

20. $f(x) = \cos^{-1}(x^6)$

6. $f(x) = \ln(5x^2 - 8x + 3)$

14. $f(x) = \arctan(10x)$

21. $f(x) = 2^{\sin(-5x)}$

7. $f(x) = -\frac{\sin x \cos x}{2} + \frac{x}{2}$

15. $f(x) = \ln(\tan x)$

22. $f(x) = e^{\sin x + \cos x}$

8. $f(x) = e^{-x^2}$

23. $f(x) = \sin(\ln(x^3))$

Practice Problems - Answers

1. $f'(x) = -e^{3-x}$

2. $f'(x) = \frac{1}{x^2 + 1}$

3. $f'(x) = -\frac{\cos x \sin x}{\sqrt{a^2 - \sin^2 x}}$

4. $f'(x) = \frac{3}{\sqrt{1 - 9x^2}}$

5. $f'(x) = 10x (\ln 2) 2^{5x^2+1}$

6. $f'(x) = \frac{10x - 8}{5x^2 - 8x + 3}$

7. $f'(x) = \sin^2 x$

8. $f'(x) = -2xe^{-x^2}$

9. $f'(x) = 10^{\sin x} [-\sin x + (\ln 10) \cos^2 x]$

10. $f'(x) = xe^{-2x}$

11. $f'(x) = \frac{\arcsin x}{\sqrt{1 - x^2}}$

12. $f'(x) = 20 \cos^2 2x - 20 \sin^2 2x = 20 \cos 4x$

13. $f'(x) = x \ln x$

14. $f'(x) = \frac{10}{100x^2 + 1}$

15. $f'(x) = \frac{\tan^2 x + 1}{\tan x} = \tan x + \cot x$

16. $f'(x) = \frac{1}{(x+1)^2}$

17. $f'(x) = \frac{1}{2x^2 + 2x + 1}$

18. $f'(x) = \frac{2x}{\sqrt{1 - (x^2 - 1)^2}}$

19. $f'(x) = \frac{\tan x}{\ln 3}$

20. $f'(x) = -\frac{6x^5}{\sqrt{1 - x^{12}}}$

21. $f'(x) = -5 (\ln 2) \frac{\cos 5x}{2^{\sin 5x}}$

22. $f'(x) = e^{\cos x + \sin x} (\cos x - \sin x)$

23. $f'(x) = \frac{3}{x} \cos (\ln x^3)$